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Revision of the Genus *Asimina* in North America.

BY GEO. V. NASH.

The genus *Asimina* was founded by Adanson* in 1763. Catesby's† figure, on which Linnaeus‡ based his *Annona triloba*, is cited by Adanson, thus leaving no doubt as to the type of the genus. In 1803, Michaux§ gave the name of *Orchidocarpum* to this group of plants, probably from the resemblance of the young carpels to the tuberous roots of many members of the Orchidaceae. Torrey and Gray|| merged *Asimina* in *Uvaria*, to which it cannot be referred, the difference in size of the outer and inner petals readily separating it from that genus. This was the view later held by Dr. Gray, as set forth in the Botanical Gazette,** where the characters, maintaining *Asimina* as distinct from *Uvaria* and worthy of generic rank, are indicated.

The genus is restricted to North America, with a possible extension into Mexico, if the three or four imperfectly known species occurring there prove to belong to this genus, a question about which there is considerable doubt. The forms from the West Indies, placed here by Grisebach,†† would seem to belong elsewhere, the uniform size of the outer and inner petals excluding them from *Asimina*.

In North America the genus *Asimina* is mainly confined to the southeastern parts of the United States, one species only, *A. triloba*, occurring as far north as southern New York and Michigan, and extending to the west, along the Gulf, as far as eastern Texas. This appears to be the only one that occurs any great distance beyond the general range of the genus, with the possible exception of *A. parviflora*, which, according to Dr. Chapman, in his Flora of the Southern States, occurs in North Carolina. I have

* Fam. Pl. 2: 365.

† Nat. Hist. 2: 85. pl. 85.

‡ Sp. Pl. 537. 1753.

§ Fl. Bor. Am. 1: 329.

|| Fl. N. A. 1: 45. 1838.

** 11: 161-2. 1886.

†† Cat. Pl. Cub. 3. 1866.

seen no specimens authenticating this, however; in fact, Georgia is the most northern state from which I have seen specimens of this species. The remainder of the genus is confined to Georgia, Florida and Alabama.

Asimina, as here understood, comprises seven species, one of which, though quite common in herbaria, has remained undescribed up to the present time, owing to its early and wrong identification with the *A. grandiflora* of Dunal,* which was based on the *Annona grandiflora* of Bartram.† These excellent figures, and the description accompanying that of Dunal, make it difficult to understand why such a mistake should have occurred. This matter will be discussed later, in its proper place.

A large number of specimens, contained in the herbarium of Columbia University, has been examined. In addition to these, the material in the National Herbarium and that in the herbarium of Prof. Lester F. Ward, at Washington, have been kindly loaned for examination. The study of this material has seemed to warrant the following disposition of the species.

Key to the Species.

Flowers borne in the axils of the deciduous leaves of the preceding year, hence appearing before or with the leaves.

Leaves thin, not reticulated; a solitary purple flower in the axil.

Mature outer petals 2 cm. long or larger, more than twice the length of the sepals; a small tree 3-12 metres high. 1. *A. triloba*.

Mature outer petals 1 cm. long or smaller, less than twice as long as the sepals; a small shrub 15 dm. high or less. 2. *A. parviflora*.

Leaves thick, leathery and reticulated when old; 1 or 2 yellowish white flowers and often a branchlet arising from the same axil.

Young leaves sparingly tomentose above and soon glabrous, tomentose beneath; mature outer petals 2.5-4 cm. long. 3. *A. reticulata*.

Young leaves densely tomentose on both sides; mature outer petals 4-5 cm. long. 4. *A. speciosa*.

Flowers terminal, or borne in the axils of the leaves of the season, hence appearing after the leaves.

Flowers terminal, sessile or nearly so; leaves short and broad, obovate to oval.

5. *A. obovata*.

Flowers axillary and long-peduncled, rarely single and terminal in No. 7; leaves long and narrow, oblanceolate to oblong.

* Monog. Anon. *pl.* 11. 1817.

† Travels, *pl.* 2. 1791.

Mature outer petals 3 cm. long or less, changing color, becoming deep black-purple at the time of falling.

6. *A. pygmaea*.

Mature outer petals 3.5 cm. long or more, not changing color, remaining yellowish white at the time of falling.

7. *A. angustifolia*

1. *ASIMINA TRILOBA* (L.) Dunal, Monog. Anon. 83. 1817.

Annona triloba L. Sp. Pl. 537. 1753.

Orchidocarpum arietinum Michx. Fl. Bor. Am. 1: 329. 1803.

Porcelia triloba Pers. Syn. 2: 95. 1807.

Uvaria triloba Torr. & Gr. Fl. N. A. 1: 45. 1838.

A small tree, 3–12 metres tall, the bark of the mature branchlets reddish brown or sometimes gray. Branchlets and leaves when young, peduncles, exterior surface of the sepals and young petals tomentose with reddish brown hairs; mature leaves obovate or obovate-cuneate, 10–30 cm. long, 4–11 cm. wide, abruptly acuminate at the apex, usually acute, but sometimes rounded at the base, thin, glabrous above, the midrib and primary nerves, which are prominent on the lower surface, usually more or less pubescent; petioles 1 cm. long or less, glabrous or sparingly pubescent; flowers in the axils of the deciduous leaves of the preceding year, on peduncles 8–15 mm. long, which are often recurved; sepals from ovate to orbicular-ovate, 8–12 mm. long; petals at first greenish, later purple and conspicuously veined, the outer ones nearly orbicular, 2–2.5 cm. long, more than twice the length of the sepals; fruit 7–15 cm. long, 2.5–4 cm. thick, oblong, cylindrical, when full grown at first hard, green and glaucous, later turning yellow, and when fully ripe becoming soft and edible and brown or almost black in color; seeds brown, oblong, 2–2.5 cm. long, 1–1.5 cm. broad, compressed, obtuse at the apex and usually obliquely truncate at the hilum.

Rich and moist soil from western New York and Pennsylvania to southern Michigan and Kansas, south to middle Florida and eastern Texas.

A large number of specimens of this, the most frequent and widely distributed species, were examined, but it is so well known that a detailed list is not necessary.

2. *ASIMINA PARVIFLORA* (Michx.) Dunal, Monog. Anon. 82. *pl.* 9. 1817.

Orchidocarpum parviflorum Michx. Fl. Bor. Am. 1: 329. 1803.

Porcelia parviflora Pers. Syn. 2: 95. 1807.

Uvaria parviflora Torr. & Gr. Fl. N. A. 1: 45. 1838.

A small shrub 15 dm. tall or less, with gray to reddish bark. Branchlets, young leaves, particularly the lower surface, peduncles, and the outside of the young sepals and petals tomentose with bright reddish brown hairs; mature leaves 6–17 cm. long, 3–9 cm. wide, obovate to oblong-obovate, acute at the apex, narrowed at the base, thin, glabrous above, usually more or less tomentose beneath, especially on the midrib and veins; petioles tomentose, 6 mm. long or less; flowers solitary from the axils of the deciduous leaves of the preceding year, on peduncles 5 mm. long or less; sepals ovate, 5–7 mm. long; mature outer petals ovate to broadly oval, 7–10 mm. long, less than twice the length of the sepals; fruit, not fully mature, oblong, about 3 cm. long, sparingly pubescent.

In the low and middle country from North Carolina (according to Dr. Chapman) to Florida, west to Alabama.

Specimens examined:

Georgia: Small, Gwinnett Co., July 20, 1893; Stone Mountain, May 1–18, 1895.

Florida: Curtiss, nos. 85, 4201 and 4545, all from the vicinity of Jacksonville.

Canby, Hibernia, March, 1869.

J. D. Smith, no. 27, Clay Co., March 10, 1883.

Rugel, near Tallahassee, April, 1843.

Chapman, no data.

Le Conte, no data.

Alabama: Buckley, April and June.

Winchell, no data.

3. *ASIMINA RETICULATA* Shuttlw.; Chapm. Fl. S. St. 603. 1884.

Asimina cuneata Shuttlw.; A. Gray, Bot. Gaz. 11: 163. 1886.

A small shrub 5–10 dm. tall, with bark of a grayish brown to brown color, the branchlets, lower surface of the young leaves, peduncles and the exterior surface of the sepals and young petals densely tomentose with reddish brown hairs. Young leaves somewhat tomentose above, soon glabrous; mature leaves narrowly oblong, inclining to narrowly obovate or oblanceolate, 2.5–9 cm. long, .5–2 cm. broad, thick and leathery, glabrous, reticulated, the midrib and nerves prominent beneath; petioles 1–2 mm. long; flowers on peduncles 5–8 mm. long, from the axils of the deciduous leaves of the preceding year, sometimes accompanied by a branchlet; sepals ovate, 5–7 mm. long; mature outer petals oval to obovate, 2.5–4 cm. long, 1.2–1.5 cm. broad,

much exceeding the inner ones and about five times the length of the sepals, pubescent on the outside, particularly toward the base; immature fruit obovate, nearly glabrous.

Pine barrens of Peninsular Florida.

Specimens examined:

Garber, Tampa, May, 1876.

Lester F. & Rosamond Ward, Tampa, February 27, 1891.

Nash, Tampa, no. 2477, August, 1895.

Hubbard, March 1, 1883, no locality.

Simpson, 1880, no locality, but probably in the vicinity of Manatee.

Webber, no. 148, Mt. Dora, Lake Co., March, 1894.

Palmer, no. 6, Fort Capron, Indian River, 1874.

Bates, Merritt's Island, Indian River, March and April, 1889.

4. ASIMINA SPECIOSA.

Orchidocarpum grandiflorum Michx. Fl. Bor. Am. 1: 330. 1803.?

Porcelia grandiflora Pers. Syn. 2: 95. 1807.?

Uvaria obovata Torr. & Gr. Fl. N. A. 1: 45. 1838.

Asimina grandiflora A. Gray, Bot. Gaz. 11: 163. 1886. Not Dunal. 1817.

A small shrub, 6-12 dm. tall, with gray smooth bark. Branchlets, as well as the peduncles and both surfaces of the young leaves, densely tomentose with yellowish or tawny hairs; mature leaves oblong, narrowly obovate or obovate, 7-14 cm. long, 2.5-7 cm. broad, thick and leathery, reticulated, tomentose on both sides, sparingly so above; petioles 3-7 mm. long, densely tomentose; flowers, sometimes accompanied with a branchlet, from the axils of the deciduous leaves of the preceding year, on peduncles 7-18 mm. long; sepals ovate, 6-8 mm. long, tomentose; mature outer petals oval to obovate, 4-5 cm. long, 2.5-3.5 cm. broad, much exceeding the inner ones, and about six times as long as the sepals, pubescent, particularly on the outside near the base; immature fruit glabrous.

This plant has been referred to the *A. grandiflora* Dunal, which was based on *Annona grandiflora* Bartram. It is not that plant, as is plainly indicated by a reference to the excellent figures of Bartram* and of Dunal† where the flowers are shown as terminating

* Travels *pl.* 2. 1791.

† Monog. Anon. *pl.* 11. 1817.

the branchlets. The description of Dunal,* moreover, calls for a plant with sub-sessile flowers and the branchlets and the lower surface of the leaves "rufo-pubescentibus," characters certainly not to be found in *A. speciosa*, the flowers of which are lateral, from the axils of the deciduous leaves of the preceding year, and the pubescence merely yellowish white or tawny. The long peduncles also serve well to distinguish this from the true *A. grandiflora* Dunal, which is described in this revision under the name *A. obovata*.

Sandy pine barrens, southeastern Georgia and East Florida.

Specimens examined:

Georgia: Small, Trader's Hill, Charlton Co., June 12-15, 1895.

Florida: Curtiss, nos. 86, 4,200 and 4,588, and a specimen with no number collected in 1875, all from the vicinity of Jacksonville.

Reynolds, March-May, 1871.

Chapman, East Florida, 1871.

Canby, Hibernia, March, 1869.

Palmer, no. 4, Fort Capron, Indian River, 1874.

5. ASIMINA OBOVATA (Willd.).

Annona grandiflora Bartr. Trav. 18. pl. 2. 1791. Not Lamarck. 1786.

Annona obovata Willd. Sp. Pl. 2: 1269. 1800.

A shrub or small tree, 1.5-2 metres tall, with grayish brown bark. Branchlets, petioles and the lower surface of the leaves, especially the midrib and nerves, tomentose with bright reddish brown hairs; leaves 4-10 cm. long, 2-5 cm. broad, narrowly obovate to obovate, or the smaller ones often oval, glabrous above, on petioles 3-5 mm. in length; flowers sessile or nearly so, terminating the branchlets; sepals ovate or oval, 10-12 mm. long, tomentose when young, later glabrate; petals yellowish white, glabrous, mature outer ones obovate, 5-6 cm. long; fruit not seen.

Pine lands in eastern and central peninsular Florida.

Specimens examined:

Nash, no. 178, Eustis, Lake Co., March 1894.

Hulst, DeLand, March, 1891.

Bates, Merritt's Island, Indian River, March and April, 1889.

The earlier publication by Lamarck of an *Annona grandiflora* †

* l. c. 84.

† Encycl. 2: 126. 1786.

invalidates the use of this name by Dunal, so that given by Willdenow is here taken up, being the oldest one available.

6. ASIMINA PYGMAEA (Bartr.) A. Gray.

Annona pygmaea Bartr. Trav. 18. *pl.* 1. 1791.

Asimina pygmaea A. Gray, Bot. Gaz. 11: 164. 1886. Not Dunal, 1817.

A small plant, 2–4 dm. tall. Stems simple, or rarely somewhat branched, arcuate, often nearly prostrate, 2–several from the same root, somewhat shrubby below, reddish, glabrous at the base, often tomentose at and near the summit; young leaves more or less tomentose, especially beneath; mature leaves often erect, thereby appearing as if secund, oblong, oblanceolate, or spatulate-obovate, 5–15 cm. long, 1–4 cm. broad, rounded, obtuse or acutish at the apex, acute at the base, glabrous, reticulated, the midrib and principal nerves very prominent beneath, sessile, or on petioles 8 mm. long or less; flowers solitary in the axils, on slender glabrous, or somewhat tomentose, often recurved peduncles 1–1.5 cm. long; sepals ovate, 7–10 mm. long, tomentose when young, glabrate when old; petals greenish and slightly pubescent externally when young, becoming dull black-purple and glabrous at the time of falling, the mature outer ones narrowly obovate, 2–3 cm. long, 8–12 mm. broad; fruit not seen.

Pine lands in eastern and peninsular Florida.

Specimens examined:

Curtiss, nos. 87, 4202 and 4742, all from the vicinity of Jacksonville.

Nash, nos. 359 and 1919, in the vicinity of Eustis, Lake Co.

Palmer, no. 7, Fort Capron, Indian River, 1874.

Burroughs, no data.

Powell, 1872.

7. ASIMINA ANGUSTIFOLIA A. Gray, Bot. Gaz. 11: 163. 1886.

Orchidocarpum pygmaeum Michx. Fl. Bor. Am. 1: 330. 1803.

Porcelia pygmaea Pers. Syn. 2: 95. 1807. ?

Asimina pygmaea Dunal, Monog. Anon. 84. *pl.* 10. 1817.

Uvaria pygmaea Torr. & Gr. Fl. N. A. 1: 45. 1838.

A small shrub, 4–6 cm. tall. Stems several from the same root, erect or reclining, much branched, glabrous excepting at the summit, the old bark gray, the young bark reddish; leaves very variable, 5–20 cm. long, 1–3 cm. broad, linear to oblong-linear or

oblanceolate, acute or obtuse at the apex, acute at the base, glabrous, reticulated, the midrib prominent beneath, sessile, or on petioles 7 mm. long or less; flowers solitary in the axils of the leaves, or rarely terminating the branches, on slender glabrous or sparingly pubescent peduncles 1–2 cm. long; sepals ovate, nearly glabrous, 1–1.5 cm. long; mature outer petals oblong-obovate to obovate, 3.5–6 cm. long, 2–3 cm. wide, yellowish white, even at the time of falling; fruit, probably not fully grown, cylindric-oblong, about 3 cm. in length.

Pine lands in Georgia and north Florida.

Specimens examined:

Georgia: Small, Albany, Dougherty Co., July, 1895; Bainbridge, Decatur Co., June, 1895; Albany, Dougherty Co., May 24–28, 1895.

Florida: Chapman, Apalachicola.

Curtiss, no. 87*, Gainesville.

Nash, no. 2153, Lake City, Columbia Co., July 11–19, 1895.

Leavenworth, vicinity of Fort King and Fort Drane.
Alexander, Gadsden Co.

Rugel, between Tallahassee and St. Mark's, May and June, 1843.

The leaves of this plant are most variable in shape. In a specimen collected by Dr. Chapman at Apalachicola, preserved in the herbarium of Columbia University, they are from 5–8 cm. long and from 1–2 cm. wide. This matches the figure given by Dunal of his *A. pygmaea*,* having the short straight ascending branches and the petals obovate and about 3 cm. long, just as there represented. In the extreme of variation, represented by Curtiss, no. 87*, and Nash, no. 2153, the leaves are 8–20 cm. long, and only 5–15 mm. wide; the petals narrowly obovate and 5–6 cm. long. There are numerous plants connecting these two extremes; indeed, leaves nearly representing the two forms were noticed on the same plant by the writer during the past summer.

Another form of this plant has a flower terminating the branches and no flowers in the axils of the leaves. This is probably but a variation, and it seems best to refer it to this species. Dr. Small's plant, collected at Albany, Georgia, in May, 1895,

* Monog. Anon. *pl.* 10. 1817.

well represents this form ; as does also a specimen secured by Dr. Baldwin in the same State. This last is the type of the variety of *Uvaria pygmaea* mentioned by Torrey and Gray in their Flora of North America.*

The Development of the Antheridium of *Targionia hypophylla*.†

BY EFFIE B. MCFADDEN.

(PLATE 268).

One of the most characteristic of our Californian liverworts is *Targionia hypophylla*, a species common in southwestern Europe, but which has not been described from the eastern United States.‡ The specimens studied were collected mostly in October and November on the slopes of sandy banks in the vicinity of Stanford University.

Targionia is our sole representative of the family Targionieae, which includes the genus *Cyathodium*. *Targionia* is perennial, becoming completely dried up at the end of the rainy season, and remaining so until the rains set in again, when it begins at once to grow actively. The structure of the thallus is similar to that of the typical Marchantiaceae, except that the branching is not usually dichotomous, but instead is largely due to lateral adventitious branches growing from the ventral surface. The antheridial shoots are of this character and may be easily recognized by their flattened oval form, small size and wavy outline.

The antheridia arise in acropetal succession from single superficial cells of the dorsal segment of the apical cell, so that in a vertical longitudinal section of a young plant, nearly all stages of development may be seen. The first division of the primary cell is a transverse one, separating the antheridium proper from the stalk-cell. (Fig. 2.) This is followed by at least two similar walls, but the number varies considerably, four being the greatest number

*1: 45. 1838.

† This study was suggested by Dr. Douglas Houghton Campbell, of Leland Stanford Junior University, and was prepared under his direction.

‡ Underwood's Hepaticae in Gray's Manual, sixth edition, 1889.